



**Department of
Environmental
Conservation**



**Department
of Health**

Air Quality Monitoring at the Bethlehem Steel Plant Fire in Lackawanna, NY

November 21, 2016

Initial Impact of Fire



The fire started at about 7:30 am on Wednesday November 9th

Region 9 staff took this picture from Old Lakeshore Rd approximately 7 miles southwest from the fire

Initially the plume was headed due south and the majority of it was elevated

Initial Response

Wednesday Morning

Fire, Police and NYSDEC Spill Response

EPA: staff in Niagara Falls were performing facility inspections and were diverted to the scene

Wednesday Night

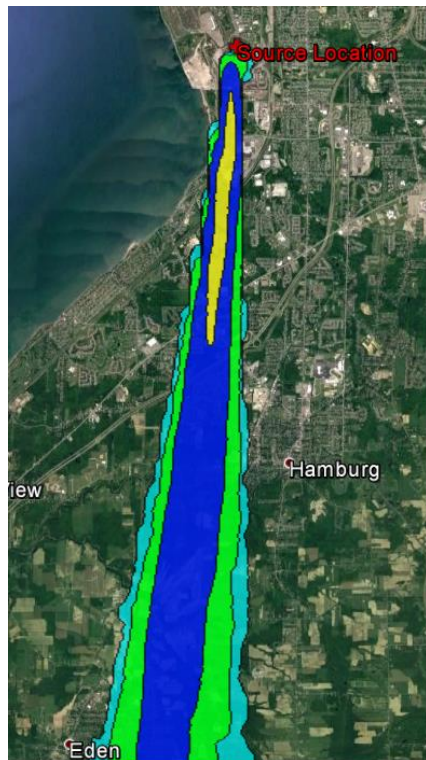
NYSDEC Air Monitoring staff (Albany)

EPA Emergency Response staff (Edison, NJ)

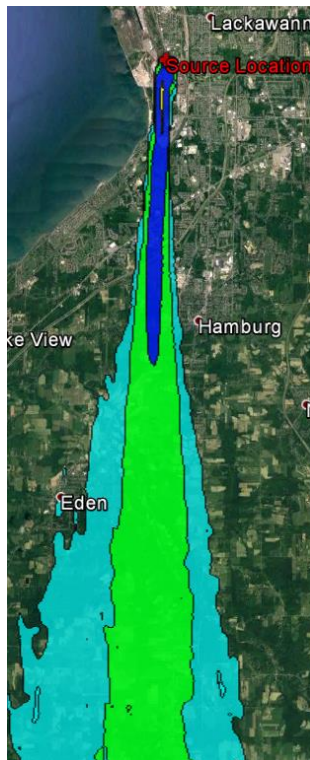


Initial Dispersion Model Results (Nov 9)

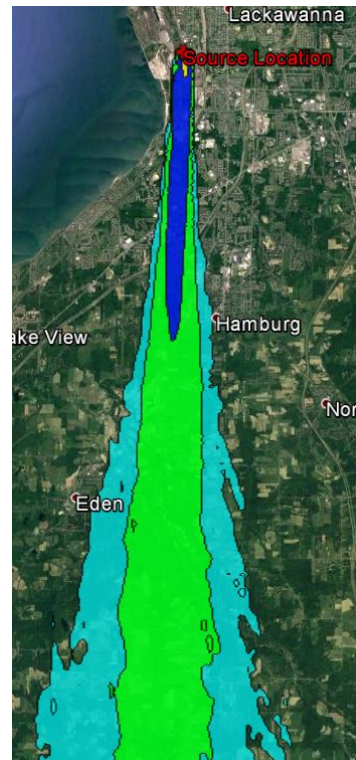
9:00 – 10:00 am



10:00 – 11:00 am



11:00 – Noon

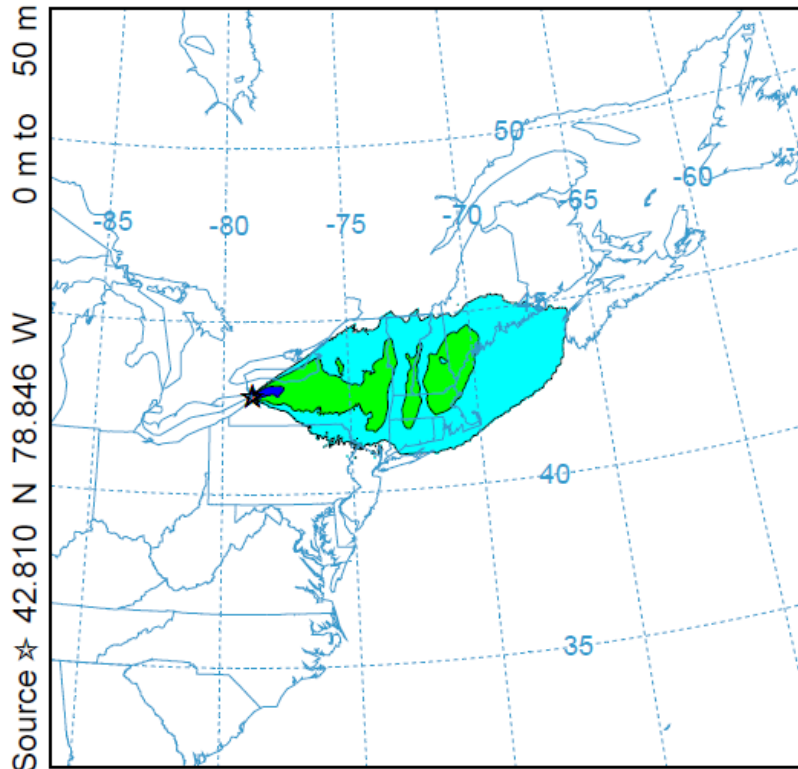


NOAA HYSPLIT MODEL

Dilution Factor ($1/m^3$) averaged between 0 m and 100 m

Integrated from 0900 10 Nov to 0900 11 Nov 16 (UTC)

Unit Release started at 0900 10 Nov 16 (UTC)



Meteorologists provided an estimate for plume direction on Thursday

DEC staff used this information to site PM monitors

Initial NYCDEC PM Monitor Locations



Deployed NYSDEC PM Samplers

Cleveland Ave and Electric Ave

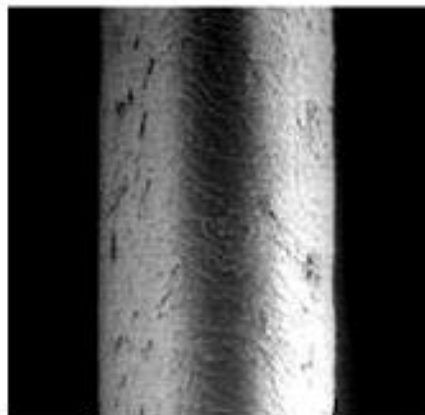


Lisa Lane and Electric Ave



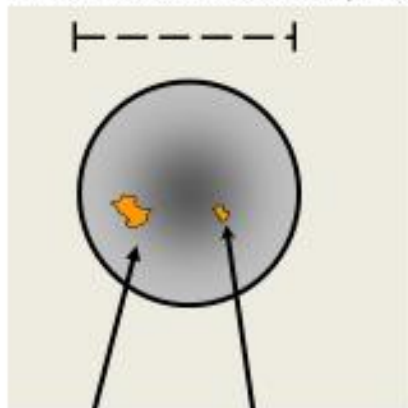
Particulate Matter: What is It?

A complex mixture of extremely small particles and liquid droplets



Human Hair (70 μm diameter)

Hair cross section (70 μm)



PM₁₀
(10 μm)

PM_{2.5}
(2.5 μm)

The Air Quality Index (AQI) allows concentration data to be related to health messages for all pollutants

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects.
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

Air Quality Index	Who Needs to be Concerned?	What Should I Do?
Good 0-50	It's a great day to be active outside.	
Moderate 51-100	Some people who may be unusually sensitive to particle pollution.	<p>Unusually sensitive people: Consider reducing prolonged or heavy exertion. Watch for symptoms such as coughing or shortness of breath. These are signs to take it easier.</p> <p>Everyone else: It's a good day to be active outside.</p>
Unhealthy for Sensitive Groups 101-150	Sensitive groups include people with heart or lung disease, older adults, children and teenagers.	<p>Sensitive groups: Reduce prolonged or heavy exertion. It's OK to be active outside, but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath.</p> <p>People with asthma should follow their asthma action plans and keep quick relief medicine handy.</p> <p>If you have heart disease: Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your health care provider.</p>
Unhealthy 151 to 200	Everyone	<p>Sensitive groups: Avoid prolonged or heavy exertion. Move activities indoors or reschedule to a time when the air quality is better.</p> <p>Everyone else: Reduce prolonged or heavy exertion. Take more breaks during all outdoor activities.</p>
Very Unhealthy 201-300	Everyone	<p>Sensitive groups: Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better.</p> <p>Everyone else: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.</p>
Hazardous 301-500	Everyone	<p>Everyone: Avoid all physical activity outdoors.</p> <p>Sensitive groups: Remain indoors and keep activity levels low. Follow tips for keeping particle levels low indoors.</p>

Wednesday

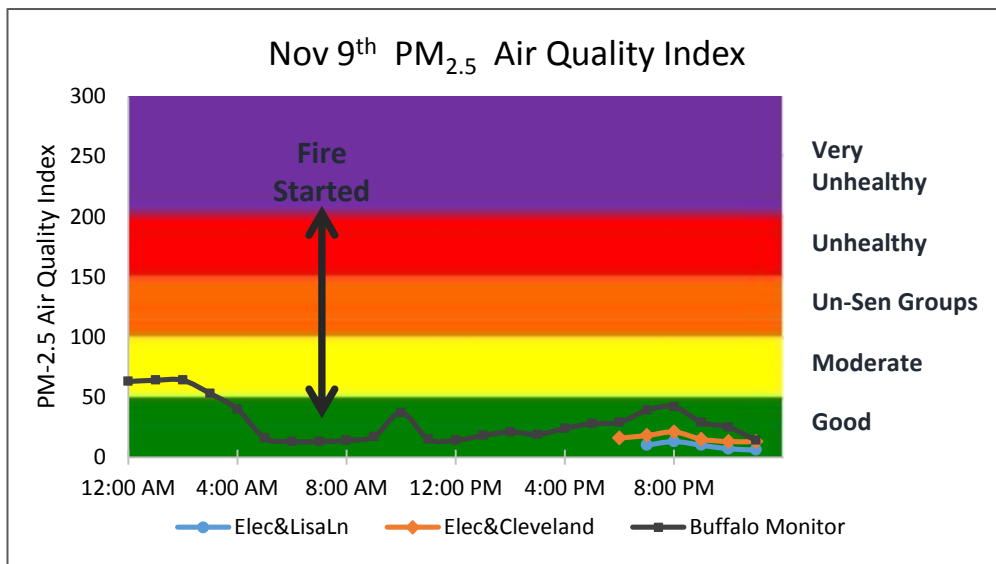
The plume was elevated and to the south of the facility and did not impact our monitors

Buffalo Monitor 24-Hr Ave data

PM-2.5 7.5 $\mu\text{g}/\text{m}^3$

Wind Dir 114 Deg

Wind Spd 10.2 mph



Fire started
after 7:00 am

NYSDEC
monitors
installed by
7:00 pm

Thursday: The Plume was further North than anticipated Lisa Lane sampler was moved to Madison Avenue

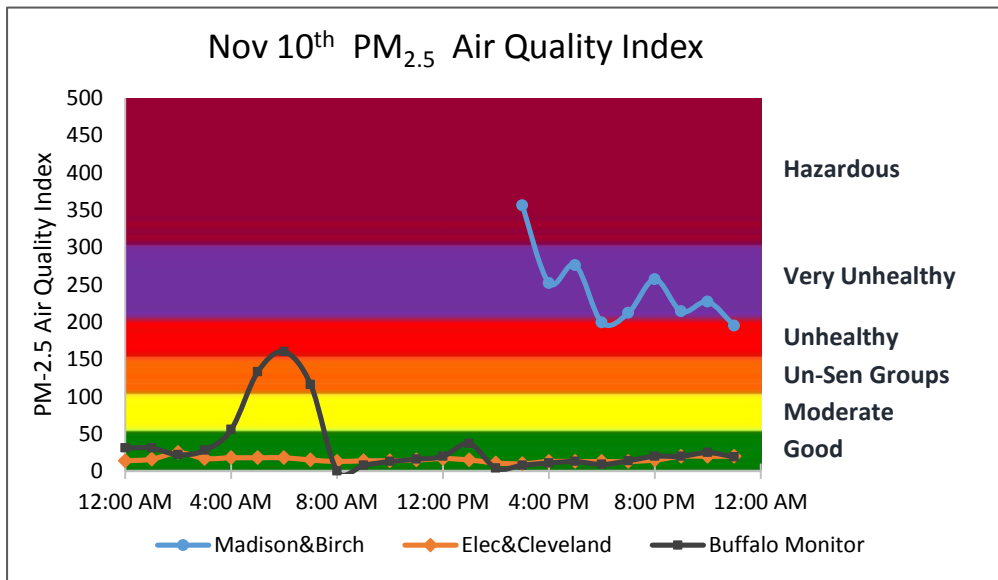


Thursday

The plume was to the North in the morning and then moved to the Northeast in the afternoon

Buffalo Monitor 24-Hr Ave data
PM-2.5 10.9 $\mu\text{g}/\text{m}^3$

Madison Ave 24-Hr Ave data
PM-2.5 192.5 $\mu\text{g}/\text{m}^3$



Morning

Wind Dir SSE

Wind Spd 8.3 mph

Afternoon

Wind Dir WSW

Wind Spd 17.3 mph

Maximum AQI is 500



Department of
Environmental
Conservation

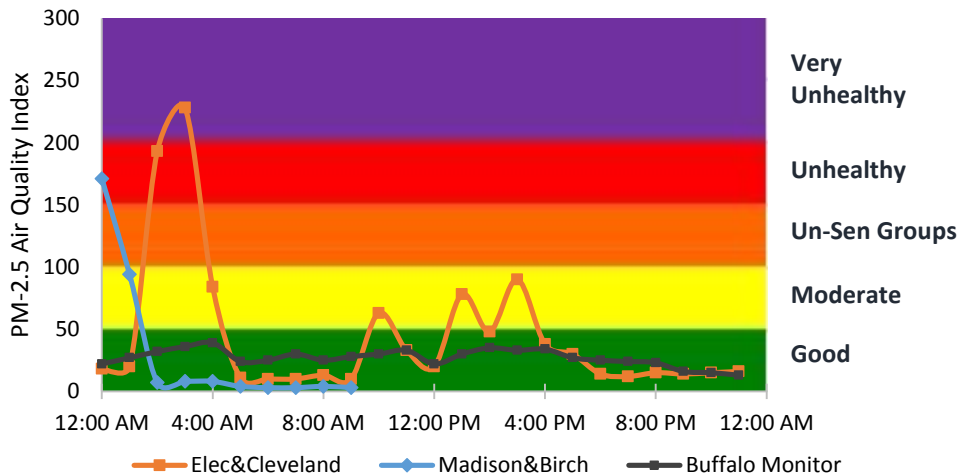
Friday

The plume was to the NNE in the morning and then moved to the WSW in the afternoon

Buffalo Monitor 24-Hr Ave data
PM-2.5 6.5 $\mu\text{g}/\text{m}^3$

Cleveland Ave 24-Hr Ave data
PM-2.5 40.3 $\mu\text{g}/\text{m}^3$

Nov 11th PM_{2.5} Air Quality Index



Morning

Wind Dir SSW

Wind Spd 11.8 mph

Afternoon

Wind Dir ENE

Wind Spd 9.2 mph



Department of
Environmental
Conservation

EPA Samplers, DEC VOC Canisters

Madison Ave and Birch - Bocce Court



Spruce St Tennis Court



Volatile Organic Compounds (VOCs)

Organic chemical compounds are everywhere in both indoor and outdoor environments because they have become essential ingredients in many products and materials.

- Outdoors, VOCs are volatilized or released into the air mostly during manufacture or use of everyday products and materials. VOCs are also formed in combustion/fire.
- Indoors, VOCs are mostly released into the air from the use of products and materials containing VOCs.

Data Available: <http://www.dec.ny.gov/chemical/108370.html>



Targeted VOCs (EPA Method TO-15)

Dichlorodifluoromethane	1,2Dichloroethane	m,p-Xylene
Chloromethane	1,1,1Trichloroethane	Styrene
Dichlorotetrafluoroethane	Benzene	1,1,2,2Tetrachloroethane
Vinyl Chloride	Carbon Tetrachloride	o-Xylene
1,3Butadiene	1,2Dichloropropane	1,3,5Trimethylbenzene
Bromomethane	Bromodichloromethane	1,2,4Trimethylbenzene
Chloroethane	Trichloroethylene	aChlorotoluene
Trichlorofluoromethane	cis1,3Dichloropropylene	1,3Dichlorobenzene
1,1Dichloroethylene	trans1,3Dichloropropylene	1,4Dichlorobenzene
Dichloromethane	1,1,2Trichloroethane	1,2Dichlorobenzene
Trichlorotrifluoroethane	Toluene	1,2,4Trichlorobenzene
1,1Dichloroethane	1,2Dibromoethane	Hexachloro1,3Butadiene
Methyl Tert Butyl Ether	Tetrachloroethylene	Acrolein
trans 1,2Dichloroethylene	Chlorobenzene	Carbon Disulfide
Chloroform	Ethylbenzene	Naphthalene

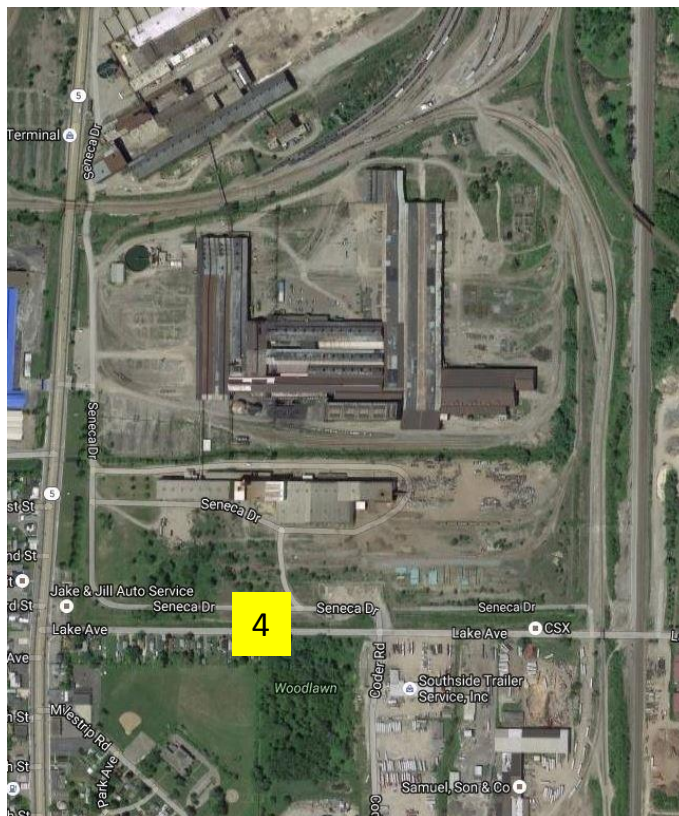
Lackawanna Canister Sampling

Sample #	Date	Time	Location	Sample Duration
1	11/10/16	11:08 am– 12:02 pm	Spruce St. Tennis Court	1 hour
2	11/10/16	11:13 am – 12:10 pm	Madison Ave Bocce Field	1 hour
3	11/10/16	5:30 pm	Seal Place	~ 1 minute
4	11/11/16	11:07 am	3711 Lake Ave	~ 1 minute
5	11/15/16	1:54 – 2:46 pm	Pine and Lincoln Ave	1 hour

VOC Sampling Locations



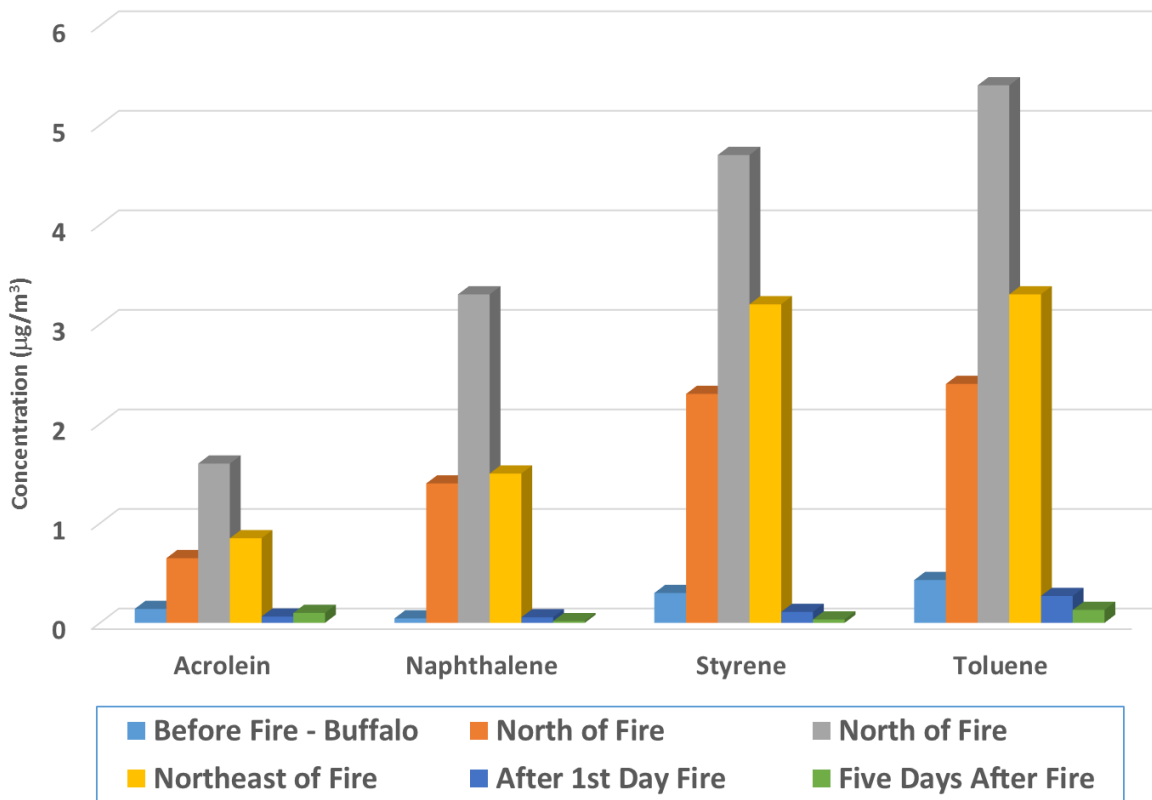
11/11 VOC Sampling Location



NYSDEC Toxics VOC Laboratory



Selected VOCs Associated with Fire



VOC Results (parts per billion)

Compound Name	Bruce St. Tennis Court	Madison Ave Bocce Field	Seal Place	Lake Ave	Pine and Lincoln Ave	Buffalo 11/2
1,2,4Trimethylbenzene	0.046	0.062	0.043	0.044	0.018	0.06
1,2Dichlorobenzene	0.024	0.066	0.034	0.0020	0.0010	0.0020
1,3,5Trimethylbenzene	0.042	0.084	0.074	0.013	0.0050	0.017
1,3Butadiene	1.6	4.6	2.6	0.081	0.0040	0.018
Acrolein	0.65	1.6	0.85	0.063	0.10	0.14
Benzene	11	37	16	0.84	0.14	0.20
Bromomethane	0.30	0.57	0.35	0.0090	0.0070	0.012
Carbon disulfide	0.027	0.041	0.018	0.0040	0.0060	0.018

VOC Results (parts per billion)

Compound Name	Bruce St. Tennis Court	Madison Ave Bocce Field	Seal Place	Lake Ave	Pine and Lincoln Ave	Buffalo 11/2
Chlorobenzene	0.040	0.18	0.099	0.0060	0.0030	0.0020
Chloromethane	0.56	1.3	1.0	0.46	0.44	0.47
Ethylbenzene	0.83	1.7	1.5	0.089	0.030	0.06
m,p-Xylene	0.34	0.73	0.36	0.15	0.045	0.20
Naphthalene	1.4	3.3	1.5	0.056	0.017	0.045
O-Xylene	0.10	0.23	0.14	0.058	0.020	0.083
Styrene	2.3	4.7	3.2	0.11	0.034	0.30
Toluene	2.4	5.4	3.3	0.27	0.13	0.43
Vinyl Chloride	0.13	0.062	0.075	0.0040	0.0070	0.0060

Health Effects from Exposure to Smoke

Exposure to smoke can cause eye, nose and throat irritation. Smoke can also worsen cardiovascular and respiratory conditions like asthma.

Health effects generally resolve quickly after exposure ends.

To prevent and/or reduce exposures, recommendations include:

- Ensure that windows and doors are closed;
- If ventilation systems are in use, set these to recirculate the indoor air
- Avoid or limit outdoor activities



NEW YORK
STATE OF
OPPORTUNITY.

**Department
of Health**

Health Effects from Exposure to Smoke

- Results of DEC's sampling found typical constituents of fires.
- Actions to reduce the public's exposure to the smoke included evacuation and limiting outdoor activities.
- Any possible exposure would have been a short term concern.
- DOH advises people with continuing symptoms to contact their health care provider.



Additional information

- Odors are expected to continue
- Strong odors can cause irritation, headaches and nausea
- Most odors will be noticeable below a level at which health effects may occur
- When conditions permit, open windows and doors to ventilate to reduce any indoor odors
- Clean hard surfaces with water and detergent



Resources:

Call the NYS Department of Health's Center for Environmental Health at 518-402-7800 or 800-458-1158.

Fact Sheets:

Smoke from Fires

http://www.health.ny.gov/environmental/outdoors/air/smoke_from_fire.htm

What you should know about fires

http://www.health.ny.gov/environmental/outdoors/air/what_to_know.htm

Particulate Matter

http://www.health.ny.gov/environmental/indoors/air/pmq_a.htm

Odors and Health

<http://www.health.ny.gov/publications/6500/index.htm>

The Center for Occupational and Environmental Medicine at the Erie County Medical Center can be reached at 716-898-5858.

Call the Erie County Department of Health at 716-961-6800.



NEW YORK
STATE OF
OPPORTUNITY.

**Department
of Health**

Thank You

- Steve Flint
- Director
- Division of Air Resources
- 625 Broadway
- E-Mail: steve.flint@dec.ny.gov
- Phone Number

Connect with us:

Facebook: www.facebook.com/NYSDEC

Twitter: twitter.com/NYSDEC

Flickr: www.flickr.com/photos/nysdec



Department of
Environmental
Conservation